English

Telemedicine operating variables in state health services in Mexico, 2016.

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Abstract

Introduction: To analyze "number of teleconsultations" and "tele-education sessions" variables that were presented by the state's health services in Mexico, in the Health Information System in 2016 in order to determine its usefulness in the follow-up of the operation of telemedicine programs. Results: Federal entities that reported to the Health Information System of State services, 16, reported teleconsultations, 182,051, tele-education sessions, 1,181. Conclusion: Integrate the teleconsultancies in the official productivity reports of the Ministry of Health allows to identify State Health Services that operate telehealth services.

Keywords: *Health Services; Telehealth-Services; Tele-education; health Information.*

Resumen

Variables de operación de telemedicina en servicios estatales de salud en México, 2016. Introducción: Analizar las variables "número de teleconsultas" y "sesiones de teleducación" presentadas por los servicios estatales de salud en México, en el Sistema de Información en Salud en el año 2016 con el fin de determinar su utilidad en el seguimiento de la operación de los programas de telemedicina.Resultados: Entidades federativas que reportaron al Sistema de Información en Salud de los servicios estatales, 16; las teleconsultas reportadas,182,05; sesiones de teleeducación, 1,181. Conclusión: Integrar las teleconsultas en los reportes de productividad oficiales de la Secretaría de Salud permite identificar Servicios Estatales de Salud que operan servicios de telesalud.

Palabras-clave: *Servicios de Salud; Servicios de Telemedicina; Teleducación; Información en Salud.*

Resumo

Variáveis de funcionamento da telemedicina em serviços de saúde estaduais do México, 2016.
Introdução: Analisar as variáveis "número de teleconsultas" e "sessões de teleducação" apresentadas pelos serviços estaduais de saúde do México, no Sistema de Informação em Saúde, em 2016, para determinar sua utilidade no acompanhamento da operação de programas de telemedicina. Resultados: Entidades federais que reportaram ao Sistema de Informação de Saúde dos serviços do Estado, 16; relataram teleconsultas, 182.051; sessões de teleducação, 1.181.Conclusões: Integrar as teleconsultas nos relatórios oficiais de produtividade do Ministério da Saúde, permite identificar os serviços estaduais de saúde que operam serviços de telessaúde.

Palavras-chave: *Serviços de Saúde; Serviços de Telemedicina; Tele-educação; Informação em Saúde.*

Introduction

The incorporation of telehealth programs in the health systems represent a challenge for the both mexican and latin american health institutions[1], the operating of these projects require a strong inversion to the telecommunications' infrastructure[2], personnel training, change in the attention processes, therefore establishing clear patterns for its measuring, monitoring and tracking are of vital importance.

Loosely the projects' coordinators seek to count on technological tools to manage information, that without a doubt are a big support in decision making, however it is necessary that these indicators are established in the correct way so that they can help improve managing the proj-

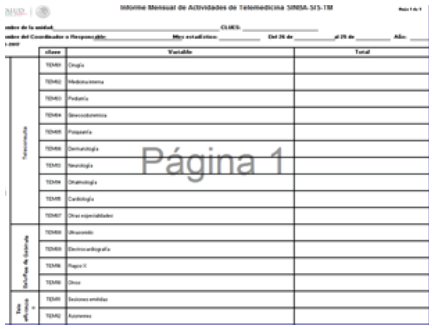
ect's resources and tasks[3]. More than 10 years ago the National Center of Health Technology Excellence (CENETEC) cooperates with various health institutions in Mexico and mainly with the State's Health Services (SeSa's) to incorporate telemedicine projects, supporting the management, technical assistance, training and with the monitoring mechanisms from the projects that are currently operating. Due to this to count on monitoring mechanisms of the telemedicine projects becomes a priority. Joined to this the evaluating efforts require information documented in a homogenous and systematic way, consequently becoming more important no analyse the variables and indicators that are solicited to the programs and projects in telemedicine and telehealth.

Generated from the mentioned cooperation between pioneering States in the implementation of the telehealth projects [nota1] between the years of 2007-2008 were: Campeche, Chihuahua, Durango, Nayarit, Nuevo León, Oaxaca, San Luis Potosí and Tabasco (in alphabetical order). By 2018, 28 of the 32 Federal Entities that constitute the Mexican Republic could be relied on, specifically the SeSa's that count on many implemented telehealth services[4].

The technological advance and the implementation of telecommunications' infrastructure is one of the facilitators so that the telemedicine programs can develop, however the human resource is considered to be the most important factor to achieve this [5], consequently one of the main strategies is the existence in each federal entity of a telehealth coordinator which has been key so that the programs can count on adequate planning. The workshops, courses and congresses that CENETEC has developed have been the foundation to the training of health professionals that are currently operating the services in the Country.

One of the challenges in the telehealth programs' management is the evaluation and monitoring of the programs. Since December 2011 it is possible to register in the Services Delivery Subsystem[nota2] the productivity of teleconsultations and tele-education sessions in the Monthly Telemedicine Activities Report and the Teleconsultations Registry which allows the reliance on variables that are used for the monitoring and tracking of the telemedicine program's operation in the state health services (Figure 1).

Figure 1. Health Secretariat. General Management of Health Information (2018). Teleconsultations Registry



[1]Since 2014 there are telehealth activities reports in federal entities such as Nuevo León. We consider pioneering states beginning with the Specific Action in Telehealth Program 2007-2012

[2]Health Information System. Service delivery subsystem. Health Secretariat. DGIS. Platform 2016. Mexico. 2016. Available at: http://pda.salud.gob.mx/cubos/

Figure 2. Health Secretariat. General Health Information. (2018). Monthly Telemedicine Activities Report.

This monitoring allows the discrimination of the currently active programs, the revision of planning against what happened, for an adequate decision making. The monitoring is a management tool that has as its purpose to warn and prevent risks in the project's processes and actions [6] incorporates performance indicators, reference data offering the following criteria:

- Data source
- Method of data collection
- Sampling calendar
- Designation of the responsible people

During the planning stage of the telemedicine projects monitoring variables were included: elaboration of long-term plans; incorporation of the program's management in the official structure; number of units with telecommunication services, that can consider themselves as foundation to the elaboration of the process' variables and implementation.

Although the substantial increment in the activities and projects related to telemedicine, few scientific evidences of the clinical and health benefits are available, and the amount of telemedicine applications that we re able to consolidate themselves in the clinical practice and incorporate themselves to assistential projects was very small[7]. The inversion in infrastructure to support telemedicine services is constant, however it is difficult to find evidences about the benefits of telehealth in the patients.

Methods

This is a descriptive, quantitative study, carried out based in the collected information about the Telehealth Programs from the Monthly Telemedicine Activities Report during the year of 2016, from the 32 Mexican Federal Entities that formed three data groups, number of tele-education sessions, teleconsultations both in a general way and in reports by medical unit.

The collection of information was carried out from publications, books and official statistics and reports' revision. Teleconsultation activities and tele-education sessions were taken considering the definitions the CENETEC emitted in 2017:

- Consultation: Process through which the doctor brings attention to the patient, carrying out a series of activities, in which it evaluates your health and the bio-risk, psychological, social and cultural factors of the individuals, with the objective to detect in early stages circumstances or pathologies that can alter its development and health.
- Education in health: Interpersonal communication process directed by the population with the objective to promote changes in lifestyles in for to benefit of your health.

When these actions are held based in information and communication technologies and distance is a factor, telehealth services are considered. The teleconsultation process that are reported are considered in the following way (National Center of Technological Excellence in Health).

Previous to the teleconsultation:

- The way in which the consultation will be held is defined, if it will be in real time, or deferred or if it'll be an emergency.
- The informed consent must be signed in which the patient must explicitly grant his authorization in a voluntary way and knowing about the risks of the procedures in which they will be submitted to. The consultant doctor will tell the patient how the teleconsultation will be held and it will remained in his power the informed consent.
- The teleconsultation request will be emitted by the consultant doctor.
- The sending of the clinical summary will be held, in which it was have as attachments studies with diagnostic interpretation, with the goal that the health professional that is granting the interconsultation can have them available previously to the beginning o the teleconsultation.
- It will be prioritized in the agenda, according to whether if it is or isn't an emergency, or if it is a real time or deferred consultation, as well as it will have the certainty that all the elements for the teleconsultations are available.

During the teleconsultation:

- It will be presented to the interconsultant doctor through the consulting doctor
- The presentation of the patient to the interconsultant doctor will be held, in which it shall be known its current state.
- The interconsultant doctor will do an interrogation to the patient.
- A physical exploration will be held by the consultant doctor that will be conducted to the interconsultant doctor.
- If all the information is enough a diagnosis will be emitted and it will be indicated to the consultant doctor how the patient's management will be held
- A space to clarify the patient's doubts will be granted by the interconsultant doctor.
- In case the information isn't enough to make a diagnosis more studies will be required or in the case of the patient being sent to on-site healthcare.

At the end of the teleconsultation:

- An intervention note will be taken by both the consultant and the interconsultant doctors, according to the Mexican regulation NOM-004-SSA3-2012 from the Medical Record.
- The storage of the teleconsultation will be held in the institution and official registrations in the information systems will be made.
- In case of it being necessary, another gathering for the teleconsultation will be held.

In the same way the process of tele-education sessions in health is which defines continuity:

Before the tele-education sessions:

- An annual sessions' program is held.
- The videoconferences are set up.
- It is programmed in the agenda the space in which the videoconference will be developed.
- There must exist coordination with the technical manager of the teams so that they can be in optimal conditions to carry out the session.
- The coordination with the session's moderator, the speakers and hosting venues must be established so that everyone involved know about the session that will be held.

During the Videoconference:

- Present the speakers.
- The speaker develops the tele-education session, deciding if he will allow to be any questions during the session or at the end of it.
- An interaction between the speaker, the moderator and the hosting venues is held.
- An assistance list is solicited to the participating venues.

After the tele-education session:

- Report in a logbook the failures and problems detected in the tele-education session.
- Report to the assistants of the session in the institution's unique format, as well as in the official information systems.
- Carry out proofs to be granted to the sessions' assistant, as well as the sending out of these proofs.
- Carry out satisfaction enquiries about the session and their analysis.

Results

The results for the teleconsultations and tele-education were presented from january 1st to december 31st, 2016, reported by the SeSa's in the Service Delivery Subsystem (SIS) from the Mexican Federal Health Secretariat.

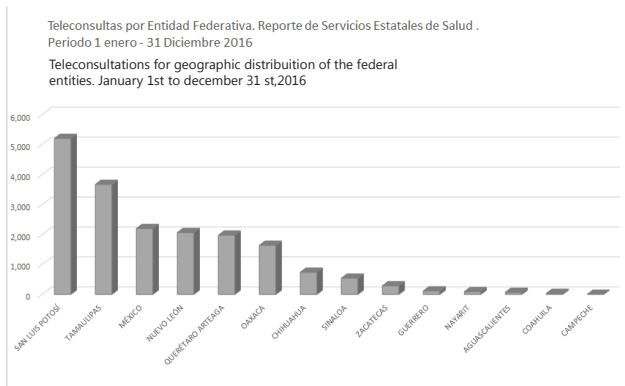
List of Federal Entities that report	16
Total of teleconsultations	182,051
Total of tele-education sessions	1,181
Total of health professionals that attend	34,585
Total of reported teleconsultation per medical unit	196,912

The figure 3 shows the geographic distribution of the federal entities that reported teleconsultation; in the following figure it is shown in a chart from the highest to the lowest number of teleconsultations per federal entity. The reports of Yucatán with 15,445 teleconsultations and the Federal District with 147,982 telephonic teleconsultations were excluded from the chart for format and visualization purposes.

Figure 3. Distribution of the states that reported teleconsultations in the SIS in 2016

Teleconsultations for geographic distribution of the entities. January 1 st to December 31 st, 2016

Figure 4. Starting at the report of the Teleconsultations per Federal Entity.



According to the filling options of the collecting format of the specialty of the granted teleconsultation, the table 1 showed the relation from biggest to smallest specialty and subspecialty that weren't included in one of these options and that incorporate themselves inside the option "other specialties".

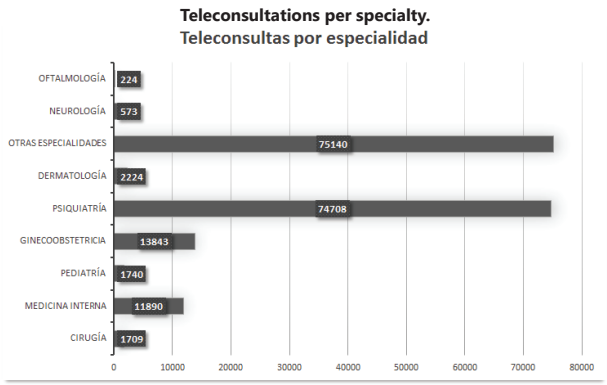
Table 1. Teleconsultations per specialty, 2016

Specialty	Total
Psychiatry	74708
Ob-gyn	13843
Internal Medicine	11890
Dermatology	2224
Pediatrics	1740
Surgery	1709
Neurology	573
Ophthalmology	224

Considering the information in table 1, figure 5 shows the teleconsultations per specialty

Teleconsultations per specialty

Figure 5. Teleconsultations per specialty, 2016.



La table 2 refers the relation between tele-education sessions and the total of assistants in them in 2016.

Table 2. Tele-education sessions and assistants.

Federal Entity	Total of sessions	Total of assistants
Nuevo León	274	6,974
Guerrero	201	14,225
México	193	2,290
San Luis Potosí	79	786
Tamaulipas	72	1,117
Oaxaca	61	1,566
Zacatecas	58	834
Sinaloa	52	902
Nayarit	42	1,961
Morelos	40	2,758
Yucatán	39	334
Coahuila	32	32
Querétaro	32	787
Campeche	06	19

The figure 6 reflects the geographic distribution of the federal entities that reported tele-education sessions. While table 3 shows the relation between the number of sessions per federal entities and the assistants to each one of them.

Figure 6. Federal Entities that grant tele-education sessions, 2016

Table 3. Average of assistants per reported tele-education session.

FEDERAL ENTITY	AVERAGE OF ASSISTANTS PER SESSION
Guerrero	70,8
Morelos	69,0
Nayarit	46,7
Oaxaca	25,7
Nuevo león	25,5
Querétaro	24,6
Sinaloa	17,3
Tamaulipas	15,5
Zacatecas	14,4
México	11,9
San Luis Potosí	9,9
Yucatán	8,6
Campeche	3,2
Coahuila	1,0

The table 4 pointed to the number of reported teleconsultations by the medical units by federal entities.

Table 4- Number of reported teleconsultations by the medical units by federal entities.

Entity	Name of the medical unit	Total
Puebla	Ggeneral Ttehuacan Hospital	2
Campeche	Dr. Javier Buenfil Osorio General Hospital Of Specialties	5
Coahuila	Cuatrociénegas Jurisdictional Office	2
	Rural Of 03 Basic Centers The Field	32
Aguascalientes	Pabellón De Arteaga Hospital Of Specialties	71
Nayarit	Dr. Antonio Gonzáles Guevara Civil Hospital	100
Guerrero	Dr. Guillermo Sobreron Acevedo	1
	Hg Adolfo Prieto	4
	Dr. Raymundo A. Alarcon Hospital Gral.	3
	Acapulco General Hospital	122
Zacatecas	Specialties In Mental Health Hospital	6
	Zacatecas Luz González Cosio General Hospital	187
	Loreto General Hospital	16
	Frenillo (Dr. José Haro Ávila) General Hospital	106
	Juan Aldama Community Hospital	1
Sinaloa	Cualicán General Hospital	
Chihuahua	Dr. Salvador Zubirán Anchondo General Hospital	106
	Central Of The State Gh	3

	Women's Hospital	347
	Juárez Gh	248
	Cd. Juárez Hies	94
	Cessa Ascension	1
Oaxaca	General Management Of Telemedicine	1,637
Querétaro	Queretaro General Hospital	2,151
Mexico	Mónica Pretelini Sáenz Maternity And Perinatal Hospital	332
	Lic. Adolfo López Mateos Medical Center	660
	Zumpango Regional Hospital Of High Specialty	225
	Las Americas General Hospital	25
	La Perla Nezahualcuyotil General Hospital	705
	Gh Texcoco Guadalupe Victoria Bicentenario	296
Nuevo León	Metropolitan Hospital	476
	Maternity And Children's Clinic Regional Hospital	86
	Virginia Ayala De Garza General Hospital	1,027
	Cerralvo General Hospital	62
	Montemorelos General Hospital	527
	Doctor Arroyo General Hospital	133
Tamaulipas	Tamaulipas Children's Hospital	6
	Victoria City Dr José Macías Hernandéz General Civil Hospital	98
	Victoria Dr Norberto Treviño Zapata General Hospital	12
	Cd. Mante Dr Emilio Martinéz Manautou General Hospital	3,578
San Luis Potosí	Dr Ignacio Morones Prieto Central Hospital	813
	Dr. Alberto Lópes Hermosa Children's And Women's Hospital	577
	Dr Everardo Neuman Psychiatric Clinic	771
	Graciano Sánchez Soledad General Hospital	455
	Matehuala General Hospital	761
	Ríoverde General Hospital	1,822
	Cd. Valles General Hospital	336
Yucatán	Celestún Health Center	256
	Agustin O'haran General Hospital	11,935
	Psychiatric Hospital	8
	Valladolid General Hospital	2,300
	Community Hospital In Ticul	1,090
Distrito Federal	D.F Health Secretariat Central Office	161,754
		196,912

Analysis

The relation that SeSa's that report teleconsultations with the tele-education sessions is very similar, which showed coherence of the current programs in 2016. In addition considering that the analysed variables that didn't report in an automatic way and required in a trimestral way the collection

of information. The commitment of the coordinators of the telehealth programs from this entities to report in a systematic way in the information official system is recognized.

Discrepancy was found between the relation of the entities that report teleconsultations requests per medical unit (table 4) with the relation of teleconsultation reports per federal entity (table 1 figure 4). The first relation was created directly in the medical units that carry out the teleconsultation, the second is a trimestral collection. The causes of the differences can be various and is not an object of this analysis however it offered elements to seek improvement in the quality of the information that was received.

Discussion

It is important to always that the telemedicine projects are general processes of medical attention consequently considering as maximum indicator the single indicator to the number of teleconsultations granted by their advances in the operation.

Since the planning of the telemedicine projects it is seeked to incorporate indicators to measure the advance in the implementation of the projects as well as the impact in the actions in the patients' health. CENETEC has seeked to drive the incorporation and implementation of this kind of projects, it is contemplated as one of the priorities to give the best use of the public resources, however it is necessary to monitor and follow continuously the projects' results.

When relating various indicators it can be observed that there is a sub registry to the time to present the results, however this data allow the monitoring and tracking of the telehealth programs in a macro level. The article presents the measuring of the teleconsultations and tele-education sessions from the Health Information System from the Mexican Health Secretariat, that were presented in the telehealth programs in the SeSas during the year of 2016. In this study it was included the variables from desk studies and the number of assistants in the sessions, as well as the other modalities in which telehealth can be granted that are not collected by official registries. This monitoring supports the management of telehealth services. The registry is held in a official manner in the health information system in Mexico through the delivery service subsystem, this is at a migration fase since a new called National System of Basic Information in Health, which will have as goal the exchange and analysis of health information in all national territory.[nota3]

The telehealth service units in 2016 were 548 in the State's Health Services and from this units would be excluded from this article the definition of how many doctors are available for the telehealth services per federal entity, as well as the first time or monitoring patients.

On of the limitations for this study is that in Mexico telehealth services as granted as they are: interconsultation, consultation, second opinion, medical assistance, patient's monitoring, diagnostic interpretation, health education, health training, management of services and epidemiologic surveillance; in turn these services can be granted through various medium of communication such as: telemedicine stations, videoconference groups and softwares, free videoconference software and/or chat, web platform, mobile device, medical mobile device, conventional phone, tele-presence mobile device [4], the same that were excluded from this article.

In this study the only limited thing was the writing of teleconsultation and tele-education reports in Mexico during the year of 2016.

Conclusion

To integrate teleconsultations in the official productivity reports from the Health Secretariat allows to identify the medical units and federal entities that operate health services. However it is not the only indicator that has to relate with other information and data to conclude if the operation of the telehealth services in the federal entities is adequate, support to seek the objectives in the least amount of time with the least amount of resources. It is considered to be an operation and process indicator and it should compare to the same planned number of teleconsultations.

It is a staple indicator and will serve for the analysis of the demographic and economic clinical aspects of the project if it can be related to nominal information that is bond and collected in a local way by the project.

Telemedicine is a medical attention process, and its evaluation should involve social, economic, demographic and ethical aspects of the use of technology and cannot concentrate solemnly in a pair of variables.

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